

A Versatile Laser-Induced Incandescence System for Non-Intrusive Measurements of Particle Size and Mass in Aircraft Emissions, Phase I

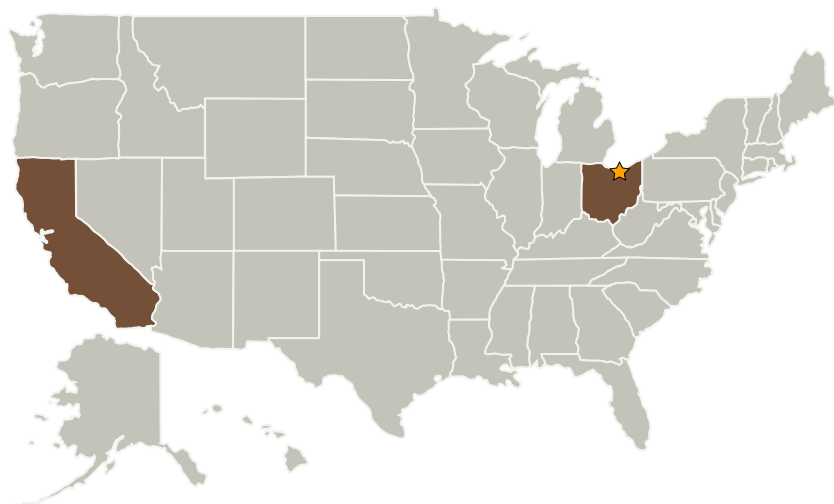
Completed Technology Project (2005 - 2005)



Project Introduction

We propose to develop a versatile and affordable system to measure the average diameter of primary soot particles along with their mass concentration in aircraft engine exhausts. This work will expand upon our recent experience applying laser-induced incandescence (LII) to obtain the first successful quantitative measurements of spatially and temporally resolved, non-intrusive soot particle mass concentration in an aircraft engine test. The proposed system will take advantage of recent research suggesting that particle size can be obtained from the LII decay rate. Advances in laser and photodiode technology should enable compact, inexpensive components to be used. A simple calibration procedure will help minimize the requirements for operator expertise and training. Advanced, experimentally validated algorithms will be used to compute soot particle size and mass, with the results displayed in real time during an engine test. The tasks described in this proposal are essential steps leading to a versatile LII system that can be routinely applied to engine testing programs, and subsequently commercialized. Our goal is to develop an LII system suitable for widespread use; therefore, it will be portable, inexpensive, and easy to operate. The proposed Phase I effort will demonstrate the feasibility of this system.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center (GRC)	Lead Organization	NASA Center	Cleveland, Ohio
MetroLaser, Inc.	Supporting Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Laguna Hills, California

Primary U.S. Work Locations

California	Ohio
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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Thomas B Jenkins

Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.1 In-Situ Resource Utilization
 - └ TX07.1.2 Resource Acquisition, Isolation, and Preparation